

REMARKS

Claims 1-11, as amended, remain herein.

Applicants appreciate the statements in the Office Action that claims 6 and 7 would be allowable if rewritten in independent form including all of the limitations of the independent claim(s) from which they depend.

Applicants respectfully request the Examiner to exercise his discretion and enter the substitute specification enclosed herewith, to replace the originally filed specification. The substitute specification includes minor, editorial changes in nearly every paragraph. Both a clean copy and an underlined/bracketed copy showing the changes from the originally filed specification are provided. No new matter has been added to the disclosure.

Claims 1-11 have been amended to recite more clearly applicants' invention. The phrase "an item of server automatic control equipment" has been edited to read "an automation equipment server" and the phrase "an item of client automatic control equipment" has been edited to read "a client automation equipment" in claims 1-11 and the specification.

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Claim 1 has been amended to recite the link mechanism comprising a detection "means for detecting presence of at least one automatic control equipment server", a description "means for querying identification of said detected server", and a service "means for communicating with said identified server."

See the specification at page 8, first full paragraph.

Minor edits have been made to the specification and claims to correct misspelled words and for clarity.

The title has been amended to read "System for Accessing Automatic Control Equipment via a Wireless Proximity Network."

1. The original Abstract has been amended.

2. Claims 1, 2, 4, 5, 8, 9 and 11 were rejected under 35 U.S.C. §103(a) over Gastouniotis et al. U.S. Patent 5,438,329 and Tang et al. U.S. Patent 6,347,095.

The presently claimed access system comprises an automatic control equipment server comprising transmission/reception means for transmitting and receiving messages on a wireless proximity network using radio waves, a link mechanism, and server

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communication means for linking with a receiving means; and at least one mobile device comprising communication means for linking with the server communication means, or at least one client automation equipment comprising client communication means for linking with the server communication means, wherein the server communication means is for implementing the link mechanism in compliance with the Bluetooth protocol with the communication means of the mobile device or with the client communication means of the client automation equipment, to supply control, display and monitoring functions from the automatic control equipment server, the link mechanism comprising a detection means for detecting presence of at least one automatic control equipment server, a description means for querying identification of the detected server, and a service means for communicating with the detected server. This arrangement is nowhere disclosed or suggested in the cited references.

The Office Action cites Gastouniotis '329, column 5, lines 42-55, as allegedly disclosing a link mechanism comprising a detection means, a description means and a service means.

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Actually, as stated in the Office Action, at column 5, lines 42-55, Gastouniotis '329 describes instrument link 2 (mobile/remote unit) that monitors battery status of mobile/remote instrument link 2, wherein the status of the battery is detected (column 5, lines 42-43), and a message is sent by instrument link 2.

In contrast, the presently claimed access system comprises a link mechanism comprising a detection means for detecting presence of at least one automatic control equipment server, a description means for querying identification of the detected server, and a service phase for communicating with the identified server. Gastouniotis '329 does not perform any such detecting, querying identification, or communicating with an identified server, with either instrument link 2 or any other component. Therefore, Gastouniotis '329 does not disclose or suggest all of the elements of applicants' claim 1.

The Office Action admits that Gastouniotis '329 does not disclose Bluetooth protocol over a wireless network and cites Tang '095 as allegedly disclosing same. And, Tang '095 does not provide the deficiencies of Gastouniotis '329 described herein.

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For the foregoing reasons, neither Gastouniotis '329 nor Tang '095 contains any teaching, suggestion, reason, motivation or incentive that would have led one of ordinary skill in the art to applicants' claimed invention. Nor is there any disclosure or teaching in either of these references that would have suggested the desirability of combining any portions thereof effectively to anticipate or suggest applicants' presently claimed invention. Claims 2, 4, 5, 8, 9 and 11, which depend from claim 1, are allowable for the same reasons described herein for claim 1. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

3. Claims 3 and 10 were rejected under 35 U.S.C. §103(a) over Gastouniotis '329, Tang '095 and de Silva et al. U.S. Patent 6,564,320.

Claims 3 and 10, which depend from claim 1, are allowable for the same reasons described herein for claim 1. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

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For the foregoing reasons, none of Gastouniotis '329, Tang '095, or Silva '320 contains any teaching, suggestion, reason, motivation or incentive that would have led one of ordinary skill in the art to applicants' claimed invention. Nor is there any disclosure or teaching in any of these references that would have suggested the desirability of combining any portions thereof effectively to anticipate or suggest applicants' presently claimed invention. Claims 3 and 10, which depend from claim 1, are allowable for the same reasons described herein for claim 1. Accordingly, reconsideration and withdrawal of this rejection are respectfully requested.

All claims 1-11 are now proper in form and patentably distinguished over all grounds of rejection cited in the Office Action. Accordingly, allowance of all claims 1-11 is respectfully requested.

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Should the Examiner deem that any further action by the applicants would be desirable to place this application in even better condition for issue, the Examiner is requested to telephone applicants' undersigned representatives.

Respectfully submitted,

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January 12, 2004
Date



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RWP:RNW/mhs

Attachments: Clean Version of Substitute Specification
Mark-up Version of Substitute Specification

Attorney Docket No.: SCHN:002

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JAN 12 2004
PATENT & TRADEMARK OFFICE
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~~Access system to an item of automatic control equipment
via a wireless proximity network~~

System For Accessing Automatic Control Equipment Via a
Wireless Proximity Network

5

FIELD OF THE INVENTION

The present invention relates to an access system ~~to for~~
~~accessing~~ an item of automatic control equipment via a
10 wireless proximity network, using the Bluetooth protocol, for
example, from at least one mobile device or from another item
of automatic control equipment. This system may be applied to
any application belonging to the field of industrial automatic
control systems, building automatic control systems and
15 electrical distribution network monitoring and control.

BACKGROUND OF THE INVENTION

A local connection between an item of automatic control
equipment and a mobile device makes it possible, particularly
20 for maintenance or operating operators equipped with such a
mobile device, to occasionally access, by means of a

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man/machine interface integrated in the mobile device, control, display and monitoring functions, when said such operators are located in proximity to the automatic control equipment to be monitored, i.e. at a distance typically of the 5 order of a few metresmeters. The term "automatic control equipment" hereafter refers to a PLC (Programmable Logic Controller), an input/output module, a regulation device, an-a monitoring and control station, a man-machine dialogue terminal, aan intelligent sensor/actuator or any other 10 equipment related atto an automatic control application. The term "mobile device" hereafter refers to a mobile telephone, a laptop computer, a PDA (Personal Digital Assistant), but also any automatic control equipment peripheral liable to be moved, such as a printer.

15 Such a local connection usually requires an electrical connection via a cable to a connection point either point to point or via a LAN. However, it is not always easy to carry out a reliable wire connection if the automatic control equipment is difficult for the operator to access, either due 20 to an inaccessible geographic location or for access safety reasons (tightness, harmful atmosphere). In addition, in the

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long-term, repeated connections and disconnections of mobile devices may damage connection points.

Another requirement consists of ~~wishing~~ wanting to make a local connection between several items of automatic control equipment, for example, if one or more items of automatic control equipment are embedded on a mobile support, such as a truck, travelling crane, etc. According to the location of the mobile support, it is required to have ~~said~~ such mobile item of automatic control equipment communicate occasionally with another item of other automatic control equipment located in proximity for example for control and monitoring functions (transmission of orders and instructions, reception of reports, etc.).

Wireless connections produced using infrared technology already exist. However, these connections are directional and may be interrupted as soon as an obstacle is located between the transmitter and the receiver, which reduces their interest in certain automatic control applications. A rapid, reliable and easy-to-implement proximity connection would therefore be considered as significant progress for operating and maintenance operations on automatic control equipment. For

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this reason, a radio wave technology would enable improved connection reliability.

In addition, to enable the communication of with automatic control equipment and mobile devices of very diverse 5 origins, it would be desirable to have a standard technology enabling a large number of different devices to detect and identify each other automatically for a user. The Bluetooth protocol is a radio wave high-speed wireless proximity technology. This technology, derived from the world of 10 telecommunications and information technology, comes from the "Bluetooth SIG" (Special Interest Group) and enables communication between several devices located at a distance of the order of ten metres from each other (excluding repeaters and according to the state of the art). It does not 15 require configuration since any device within the field covered by a proximity network is automatically detected and synchronised with the other devices connected to this proximity network in order to be able to communicate.

Therefore, it would be of interest to use this technology 20 in the field of automatic control systems to provide a solution for the above-mentioned problems, i.e., provide a

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rapid connection from a mobile device particularly for operating and maintenance operations on automatic control equipment or provide a rapid connection between several items of automatic control equipment for control and monitoring 5 functions.

In this way, using the invention, an operating or maintenance operator, managing for example several autonomous items of automatic control equipment located at different locations, could rapidly access each item of automatic control 10 equipment from a mobile device without needing an electrical connection and without a specific procedure, thus facilitating said such operator's work.

Similarly, items of automatic control equipment, particularly automatic control equipment embedded in 15 installations liable to be moved, could easily communicate with each other (occasionally or not according to their relative location), using an access system according to the invention, enabling them to detect and identify each other transparently with respect to automatic control application 20 programs, so as to be able to exchange messages and information.

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SUMMARY OF THE INVENTION

For this reason, the invention relates to an access system between an item of server automatic control equipment 5 and an automation equipment server, which integrates transmission/reception means to transmit and receive messages on a wireless proximity network using a radio wave technology and at least one mobile device or at least one item of client automatic control automation equipment. This access system is 10 characterised in that the server automatic control equipment comprises server communication means capable of implementing a link mechanism in compliance with the Bluetooth protocol with communication means of a mobile device or with client communication means of an item of a client 15 automatic control automation equipment, in order to supply control, display and monitoring functions from the server automatic control equipment, wherein the link mechanism comprises a detection phase, a description phase and a service phase.

20 The client communication means or the server communication means of an item of automatic control equipment

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have access to an internal memory containing information relating to the automatic control equipment. According to a characteristic of the invention, the same item of automatic control equipment may comprise both server communication means
5 and client communication means.

The invention also relates to an item of automatic control equipment, wherein characterised in that it communicates on a proximity network by means of an access system according to any of the above claims.

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BRIEF DESCRIPTION OF THE DRAWINGS

Other characteristics will be seen in the following detailed description referring to an embodiment given as an example and represented in the appended figures wherein:

5 - figure 1 represents an example of architecture of the access system described in the invention between a mobile device and ~~an item of server automatic control equipment an automation equipment server~~,

10 - figure 2 represents another example of architecture of the access system described in the invention between ~~an item of client automatic control automation equipment and an automation equipment server an item of server automatic control equipment~~,

15 - figure 3 is a schematic representation of the different possible types of messages,

 - figure 4 represents ~~an item of automatic control equipment which is both client and server~~.

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DETAILED DESCRIPTION

In figure 1, an automation equipment server an item of server automatic control equipment 20 comprises transmission/reception means 25, connected to server communication means 27, themselves able to access an internal memory 28 of data from the server automatic control equipment 20. This internal memory 28 which particularly contains information relating to the status of the server automatic control equipment 20 and the representative variables of an automatic control application controlled by the automatic control equipment. It is also accessible to an automatic control application program 29 which can run in the server automatic control equipment 20 to control and monitor an automatic control application. It is thus possible to exchange information between the application program 29 and the server communication means 27. The transmission/reception means 25 are in charge of transmitting and receiving messages on a wireless proximity network 30, using a radio wave technology supporting the Bluetooth protocol. Therefore, the transmission/reception means 25 integrate the components

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required for the operation of the Bluetooth protocol particularly a Bluetooth chipset.

The server communication means 27 are capable of implementing a link mechanism with communication means 16 of 5 at least one mobile device 10. Said Such mobile device 10 comprises transmission/reception means 15 to transmit and receive messages on the proximity network 30, connected to the communication means 16. The mobile device 10 also comprises a man-machine interface 19, which includes for example a 10 keyboard or a screen, using which a user of the mobile device 10 can send queries and display responses.

Figure 2 shows an automation equipment server an item of server automatic control equipment 20 linked by a proximity network 30 to an item of client automatic control automation 15 equipment 20', comprising transmission/reception means 25' in charge of transmitting and receiving messages on a wireless proximity network 30, using a radio wave technology supporting the Bluetooth protocol. Said Such transmission/reception means 25' are connected to client communication means 26', 20 themselves able to access an internal data memory 28'. Said Such internal memory 28' which particularly contains

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information relating to the status of the server automatic control equipment 20' and the representative variables of an automatic control application controlled by the automatic control equipment. It is also accessible to an automatic 5 control application program 29' which can run in the server automatic control equipment 20' to control and monitor an automatic control application. It is thus possible to exchange information between the application program 29' and the client communication means 26'. In addition, the server communication 10 means 27 are capable of implementing a link mechanism with the client communication means 26' of at least one item of client ~~automatic control automation~~ equipment 20'.

An item of automatic Automatic control equipment has a server function when it is able to receive and respond to a 15 query sent by a client (in this case, this equipment may be referred to as a server). Conversely, an item of automatic control equipment has a client function when it is able to send a query to a server and receive the response from the server (in this case, this equipment may be referred to as a 20 client).

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To set up a link mechanism, a client (i.e. a mobile device 10 and an item of client automatic control automation equipment 20') firstly enters the detection phase to try to detect the presence of at least one server (i.e. an automation equipment server an item of server automatic control equipment 20) in the field of action 31 of the proximity network 30. For this, with reference to figure 3, the communication means of a client 16, 26' generate a detection query 11. In the case of client automatic control automation equipment 20', this 10 detection query 11 is generated by the communication means 26' at regular intervals, at the operator's request, or following an order from the application program 29'.

The server communication means 27 are continuously capable of receiving a detection query 11. Upon reception of 15 such a query, they generate a detection response 21 used to signal to the sender of the query 11 the presence of an automation equipment server an item of server automatic control equipment 20 in the field of action 31 of the proximity network 30.

20 Upon reception of said such detection response 21, the client 10, 20' continues to set up the link mechanism by

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initiating the description phase wherein the communication means of a client 16, 26' generate a description query 12 intended for the server automatic control equipment 20 that responded to the detection query 11. When it receives said 5 such description query 12, it returns a description response 22 which may include an identification and authentication of the server automatic control equipment 20, and a list of the services offered which will be accessible to the client(s).

According to the type of server automatic control 10 equipment 20, the services offered to the user of a mobile device 10 or to the application program 29' of an ~~item of~~ client ~~automatic control~~ automation equipment 20' particularly comprising application program loading and unloading, reading and writing of internal variables and inputs/outputs, 15 monitoring statuses and faults, controlling part or all of the automatic control equipment, etc., thus providing control, display and monitoring functions of the server automatic control equipment 20. All these services may clearly comprise a secure access using passwords, identification keys, or other 20 suitable means.

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When the detection response 22 from the server automatic control equipment 20 is received by the client 10, 20', the link mechanism is set up and the service phase is started. At the request of a user of a mobile device 10 and according to 5 the services offered, the communication means 16 may generate service queries 13 to the server automatic control equipment 20 and wait for the corresponding service responses 23. Similarly, at the request of the application program 29' of an 10 ~~item of client automatic control automation~~ equipment 20' and according to the services offered, the client communication means 26' may also generate service queries 13 to the server automatic control equipment 20 and wait for the corresponding service responses 23.

An ~~item of automatic~~ Automatic control equipment such as 15 that described in the invention can simultaneously have a server function and a client function. For this, it must comprise server communication means 27' and client communication means 26', able to access the internal memory 28', as shown in figure 4. In this example, an ~~item of~~ 20 automatic control equipment 20' has a server function 32 in relation to a mobile device 10, while also having a client

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function 33 in relation to another item of other server automatic control equipment 20.

Other examples of use of the present invention can be envisaged. For example, the front panel of automatic control equipment frequently comprises signalling means such as LEDs or digital displays. However, when automatic control equipment cannot be installed in the visual field of an operator located in proximity, their signalling means lose their purpose. In addition, installing display means on all automatic control equipment is a costly solution, since they are only useful in the presence of an operator. Using the present invention, it is therefore possible to envisage a portable display device serving as a mobile client device and enabling an operator equipped with such a device to replace signalling means when 15 in proximity to an item of server automatic control equipment server.

More generally, the invention may also be used to centralise various peripherals, such as a keyboard, a printer, etc., for occasional shared use between several items of 20 remote server automatic control equipment. When operators wish to use a particular peripheral in connection with a given item

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ef-server automatic control equipment, they simply position
said such peripheral in proximity to the server automatic
control equipment for the required operating time, which
avoids electrical connections and makes it possible to
5 optimise the number of peripherals in this way.

Naturally, without leaving the scope of the invention, it
is possible to envisage other variants and perfection of
details and even the use of equivalent means.

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CLAIMS

1. (Currently Amended) Access—An access system comprising:

5 an between an item of server automatic control equipment
(20), which integrates comprising:
transmission/reception means—(25) to transmit for
transmitting and receive receiving messages (11, 12, 13, 21,
22, 23) on a wireless proximity network—(30) using a radio

10 waves technology,

a link mechanism, and
server communication means for linking with a receiving
means; and

15 at least one mobile device—(10) comprising communication
means for linking with said server communication means, or at
least one item of client automatic control equipment—(20)—
comprising client communication means for linking with said
server communication means, characterised in that the server
automatic control equipment—(20) comprises wherein

20 said server communication means—(27) capable of is also
for implementing a said link mechanism in compliance with the

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Bluetooth protocol with said communication means (16) of a said mobile device (10) or with said client communication means; (26') of an item of client automatic control equipment (20'), in order to supply control, display and monitoring 5 functions from the server automatic control equipment (20),
the link mechanism comprising a detection phasemeans for detecting presence of at least one server automatic control equipment,
a description phase means for querying identification of 10 said detected server automatic control equipment, and
a service phasemeans for communicating with said identified server automatic control equipment.

2. (Currently Amended) Access — The access system
15 according to claim 1, characterised in that the further comprising an internal memory containing information relating to the server automatic control equipment, wherein the client communication means (26') or the server communication means (27, 27') of an item of automatic control equipment (20) have 20 has access to an the internal memory (28) containing information relating to the automatic control equipment (20).

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3. (Currently Amended) Access — The access system according to claim 2, characterised in that the same item of wherein said client automatic control equipment (20') may 5 comprise comprises server communication means (27') and client communication means (26'), to be able to perform for performing a server function and a client function.

4. (Currently Amended) Access — The access system 10 according to claim 2, characterised in that wherein the server communication means (27) of an item of a server automatic control equipment (20) are is for waiting for a detection query (11) sent by at least one mobile device (10) or at least one item of client automatic control equipment (20') on the 15 proximity network (30).

5. (Currently Amended) Access — The access system according to claim 4, characterised wherein in that, following the reception of a detection query (11) from a mobile device 20 (10) or an item of client automatic control equipment (20'), the server communication means (27) generate is for generating

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a detection response (21) used to signal their presence of the
server communication means to the mobile device (10) or the
client automatic control equipment (20') following reception
of a detection query sent from the mobile device or from the
5 client automatic control equipment.

6. (Currently Amended) The access Access system
according to claim 2, characterised in thatwherein the client
communication means (26') of an item of a client automatic
10 control equipment (20') transmit is for transmitting detection
queries (11) on across the proximity network (30), in order to
detect the presence of at least one item of server automatic
control equipment (20) in the field of action (31) ofwithin
the proximity network (30).

15

7. (Currently Amended) The access Access system
according to claim 6, characterisedwherein in that the
detection queries (11) are transmitted by the client
communication means (26') is for transmitting detection
20 queries at regular intervals or at the initiative of an

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application program—(29') running in the client automatic control equipment—(20').

8. (Currently Amended) The accessAccess system
5 according to claim 5, characterisedwherein in that the server communication means—(27) respond is for responding to a description query—(12) transmitted by a the mobile device—(10) or by an item of the client automatic control equipment—(20') by returning a description response—(22) which can 10 includeincludes an identification and authentication of the server automatic control equipment—(20) and a list of the services offered by the server automatic control equipment—(20').

15 9. (Currently Amended) The accessAccess system according to claim 8, characterised in that, wherein when the link mechanism is set up, the server automatic control equipment—(20) can exchange is for exchanging messages—(13, 23) with a the mobile device—(10) via the proximity network 20—(30), when the link mechanism establishes a link, such so that a user of the mobile device—(10) can perform control, display

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and monitoring functions of the server automatic control equipment-(20).

10. (Currently Amended) The accessAcess system
5 according to claim 8, characterisedwherein in that, when the
link mechanism is set up, the server automatic control
equipment-(20) can exchange is for exchanging messages-(13,
23) with an item of the client automatic control equipment
(20') via the proximity network-(30), when the link mechanism
10 establishes a link, such so that an application program-(29')
running in the client automatic control equipment-(20') can
perform control, display and monitoring functions of the
server automatic control equipment-(20).

15 11. (Currently Amended) Automatic control equipment
characterised in that it communicates on The access system of
claim 1 in combination with an automatic control equipment,
comprising automatic control equipment comprising means for
communicating over a proximity network-(30) by means of an
20 said access system according to claim 1.

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ABSTRACT

The present invention relates to an An access system between an item of server automatic control equipment (20), which integrates transmission/reception means (25) to transmit and receive messages on a wireless proximity network (30) 5 using a radio wave technology in compliance with the Bluetooth protocol, and at least one mobile device (10) or at least one item of client automatic control equipment (20'). An item of A server automatic control equipment (20) comprises includes server communication means (27) to implement a link mechanism 10 in order to supply control, display and monitoring functions of the server automatic control equipment from a mobile device or an item of clientan automatic control equipment.